

CHANGES OF THE QUALITY OF VOICE MEASURED BY THE DSI IN RELATION TO THE TEACHING PROFESSION

Jana FROSTOVÁ

Abstract: *The present paper follows the preceding stage of research directed to the changes in the voice quality related to the professional load (FROSTOVÁ 2008).*

In the first stage of the project the research concerned 47 respondents, all of them students of combined (extramural) university studies who were simultaneously active in the teaching process.

After a year the voices of these teachers were recorded again and analysed with the use of the standard DSI (Dysphonia Severity Index) method.

At the same time other teachers' voices were recorded and will be recorded again after a year; the comparison of these recordings should increase the objectivity of the obtained results. Registered were also the „new“ people's answers given in the questionnaire concerning the subjective perception of the speaking and the singing voice, the knowledge on voice hygiene, the sources of this knowledge, and the subjective evaluation of the voice load in extra-curricular activities.

The results suggest that the voice characteristics, as measured by the DSI, have slightly improved, which is the consequence of the teachers' current working on voice. The results also show that the DSI is a suitable indicator of the need to give re-education or therapy of voice disorders to all teachers.

Keywords: *voice, teachers, voice hygiene, voice evaluation, Voice Handicap Index, Dysphonia Severity Index*

Introduction

Experts rightly compare the daily many hours' use of voice in full strength and good understandability to a sport achievement. Teachers as professional voice users are to a high degree dependent on their physical and mental condition. Every illness or disease in the whole body, physical pain or a bad state of mind are known to show themselves in the voice. Today's advice and recommendations in the field of voice hygiene are developed in accordance with the latest research and its findings on man's vocal and general health.

According to many authors (Sataloff, 1998; Novák, 2000 and others), the risk factors unfavourably influencing the larynx (or mucous membranes) include: smoking, excessive alcohol consumption and the gastroesophageal reflux (which is often caused by bad eating habits). Other major risk factors participating in the origin of voice disorders are especially the following: great vocal effort connected with overloading all the vocal organs, insufficient voice rest (voice respite) and stress.

Roy et al. (2004) observes that various authors reporting on the frequency of voice disorders in teachers greatly differ: the range extends from 4.4 % to 90 %. Similarly, a considerable variability can be seen in the determinations of the frequency of all the population's voice disorders: from 0.65 % to 15 %.

In this country, the occurrence of professional voice disorders in teachers was studied by Lejska (1967), who examined 772 men and women teachers of nurse and elementary schools. Ill vocal cords (with nodes or chronic oedemas) were diagnosed in 34 teachers (4.4 % of the total number of 772), namely in 31 women (5.7 %) and 3 men (1.4 %). All the men were heavy smokers, while there were 4 smokers in the 31 women.

The occurrence of voice disorders in teachers and in the whole population was investigated abroad by Roy and his colleagues between 1998 and 2000 (2004). He contacted 2531 participants, aged 20 to 66 years, from the U.S. states of Iowa and Utah. 1243 teachers and 1288 non-teachers were asked by telephone (with the use of a questionnaire) about their possible voice troubles. The research showed that 57 % of teachers and 28.8 % of non-teachers had suffered from voice disorders at least once in their lives. During the survey there were 11 % of teachers (and 6.2 % of non-teachers) who were suffering from a voice disorder just then, and 14.3 % of teachers (and 5.5 % of non-teachers) who were just then provided with medical and rehabilitation care because of voice disorders.

Roy and his colleagues came to the conclusion that a typical representative of a teacher „having some experience with a voice disorder“ is „a woman aged 40 to 59 years, with 16 and more years' teaching practice and a family anamnesis where voice disorders occur“.

There are also other factors contributing to the development of voice disorders. ROY found out that teachers, as compared with non-teachers, are probably more prone to breath difficulties caused by allergies. The examined teachers stated that every year they had one or more colds and one or more cases of laryngitis. On the other hand, smoking (or the use of tobacco products generally) for a year or longer, as well as drinking one or more glasses of alcoholic drinks weekly for a year or longer, was less frequent in teachers than in non-teachers. No statistical difference between teachers and non-teachers was found in the occurrence of asthma, nasal infections, hay fever or family anamnesis concerning voice disorders.

These and other results support the opinion that teaching is a highly risky profession from the point of view of the development of voice disorders. Needless to say that other factors of both the **socio-cultural and biophysical nature** must be taken into account here as well.

It will be therefore necessary:

1. to gradually discover the factors that directly cause or facilitate the origin and development of voice difficulties and disorders, following from both the teaching profession itself and other fields of teachers' lives

2. to look for the best ways of preventing voice disorders and of coping with them.

Any underestimation or ignorance of the basic voice hygiene requirements can lead to a deterioration of voice parameters, especially in teachers.

Lejska (2001) divides the care for professional voice users into the fields of prevention and treatment. The field of prevention includes **the entrance preventive examinations** for indicating the suitability of the choice and pursuance of a job that needs a good voice, **periodical check-ups** establishing the immediate state of the phonic organs, **voice instructions and exercises** for a permanently sustainable high quality voice and the protection of the vocal organs against the outer negative influences, **vocal rest** and **a healthy way of life**. The treatment field includes **the treatment of both the upper air passages diseases and the larynx diseases**.

By respecting these recommendations, professional voice users can avoid mistakes that can individually or together influence permanently their vocal health as well as their position at work.

The research objective

The aim of the present stage of research, which follows the research the results of which have already been published (Frostová, 2008), is the comparison of the results of the first measurement with those of the second measurement in the first group of the examined persons; their voices were recorded at the interval of one year.

The following factors have been evaluated:

1. the voice recordings, processed by means of the DSI method (the first and the second measurements, n = 47)
2. the results of the questionnaire directed towards the subjective perception of the quality of one's speaking and singing voice, the knowledge of the principles of voice hygiene, the sources of this knowledge, the duration of the voice load in professional and extra-curricular activities, and the subjective ideas on tackling the voice disorders (n = 130)
3. the results of the VHI (Voice Handicap Index) questionnaire, establishing the subjective evaluation of the quality of one's voice and the impact one's voice has on socioprofessional functions (n = 130)

The research set of respondents

In the first stage of the project, 65 respondents were questioned (4 men, 61 women), all of them students of combined university studies who had already taken an active part in the educational process. In the present stage of research, other people were given the above mentioned questionnaires to answer, and the answers were evaluated. The "new" people's voice recordings will be compared and evaluated as a whole in the next stage of research.

The research procedure

The recording of the voices had the following phases:

The adaptation and motivation phase:

- adaptation to the experimental situation (the establishment of the contact, relaxation, the explanation of the meaning of the recordings);
- the skeleton assignment (getting acquainted thoroughly with the process of recording and with the instructions given during the recording, assuming the right physical posture, setting the microphone according to the person's height, setting the prescribed distance between the microphone and the mouth);
- stimulation to the performance.

The pre-performance phase:

- a rehearsal of the expected performance;
- exact instructions (the final details of the assignment);
- the registration of the circumstances currently influencing the performance (a previous or current illness, changes in the fitness and in the personal, as well as working, load).

The performance phase:

- making the electronic recording;
- the registration of the examined person's idiosyncrasies in the vocal performance, including the accompanying manifestations (e.g. nervousness, increased effort and other non-verbal symptoms of facing the situation);
- the database filing (the client's card, the date of the recording, notes concerning the client's performance).

The diagnostic phase:

- the registration of spontaneous describing, evaluating and reflecting commentaries and anamnestic data

The results of the author's own questionnaire were at the disposal as well. The questionnaire is directed to the subjective perception of the speaking and the singing voice, the subjectively felt need for a change of one's speaking and singing voice, the knowledge of voice hygiene, the sources of this knowledge, and the intensity of the voice load in the teaching and extra-curricular activities.

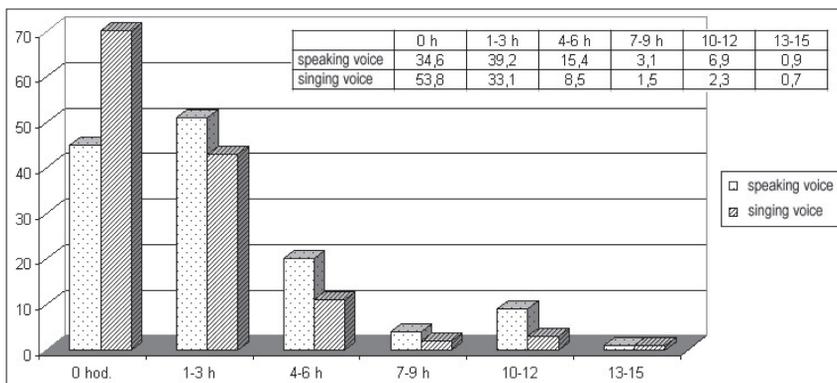
The results

The voice load in extra-curricular activities (in hours a week)

All the respondents' loads of both the speaking and the singing voice in the field of further school (beyond the scope of the regular load) activities, as well as out-of-school (leisure) activities, making demands on voice, are surprisingly low. One third of the respondents (34.6 %) do not pursue any extra-curricular activity with demands

on the speaking voice, and more than one half of the respondents (53 %) have no such activities connected with singing.

CHART 1: The voice load in extra-curricular activities (in hours a week)



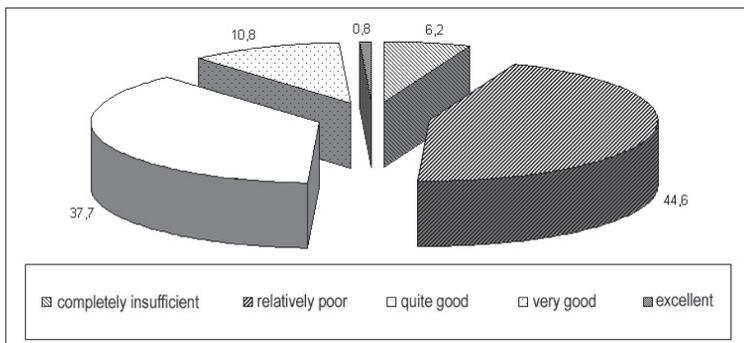
The questionnaire research has also provided an insight into the respondents' activities they pursue in the given time. They mostly lead hobby groups, the most frequent being the ones that go in for theatre, sports, singing, dance, language, ceramics and informatics. The respondents also give remedial classes in various subjects.

Singing is pursued by the respondents in various types of choirs, folklore groups, amateur theatres or musical bands.

The extent of the knowledge of voice hygiene

49 % of the respondents have some knowledge of voice hygiene, and 51 % evaluate their knowledge as relatively poor or completely insufficient.

CHART 2: The extent of the knowledge of voice hygiene



The methods of preventing voice disorders

It was interesting to learn how the respondents had prevented voice disorders before they started attending the subject “voice education“. Only 37.7 % of the respondents (49 persons = 100 %) explained how they saved their voice in practice. They said that the most frequent method they had used was “I don’t shout“, “try not to shout“(73.5 %). According to Novák (2000) the causes of the functional voice disorder (hyperkinetic dysphonia) in adults are the following: excessive voice effort, too loud speaking and shouting. Alcohol abuse and smoking are other frequent causes of voice disorders.

TABLE 1: The methods of „saving one’s voice“ as stated by the respondents

I don’t shout	73,47
I don’t speak unnecessarily	38,78
I use singing voice exercises	26,53
I drink enough liquids	26,53
I control my voice pitch	20,41
I don’t lose my temper	20,41
I observe the rest of voice	14,29
I speak in an aired room only	10,2
I speak in a low voice	10,2
I look for an acoustically good place	8,16
I use voice exercises	8,16
I don’t clear my throat unnecessarily	6,12
I use soft voice onsets	6,12
I don’t stay in a room filled with smoke	4,08
I breathe correctly	4,08
I don’t whisper	4,08
I don’t drink cold drinks	2,04

Johnson (1994) says that a wrong use of voice is regarded a common cause of voice dysfunction. He divides the specific kinds of behaviour quoted by therapists as causes of voice dysfunctions into two groups: 1) speaking activities (e.g. loud speaking or a hard voice onset) and 2) non-speaking voice activities (e.g. clearing one’s throat, loud and hard laughter, morose grumbling and muttering). Permanent models of excessive loudness can be found in certain personality types and certain professional situations (like classes or training).

The statements of the type *I don’t speak unnecessarily*, *I observe a partial or total rest of voice*, *I speak in a low voice*, *I look for an acoustically good place to reach the sonority of my voice* bear witness to the fact that the respondents are aware of the necessity not to overload their voice organs.

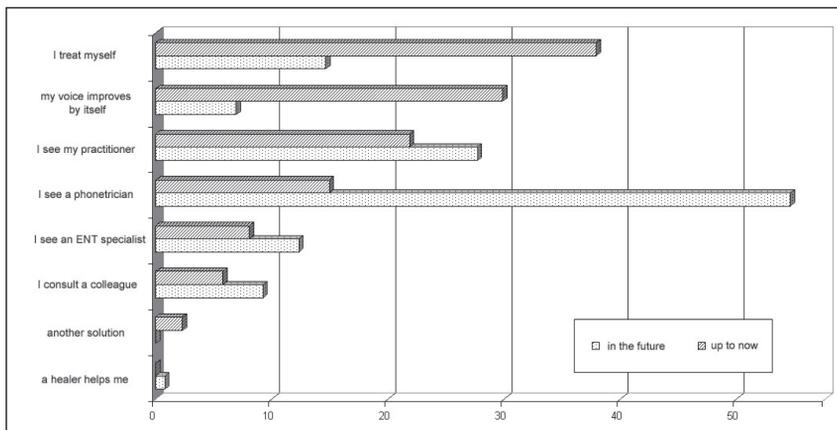
For example, the respondent L. K. (a woman, 35 years of age, 7 years of practice, 22 hours’ load, teaching music to pupils aged 11 to 15 years, leading an art hobby group

– 2 hours of the speaking voice) describes her voice care as follows: *“When I come home, I treat myself to what I call ‘a protected while’ – 15 minutes at home after the classes I don’t speak, I have a quiet rest.”* She used to have losses of voice and suffers from allergy. Therefore, as she says, she observes consistently all the voice care requirements: *“I pay attention to the voice rest, I control the intensity of my voice, I don’t shout, I don’t whisper when I’m ill, I try to use soft voice onsets.”*

The ways of tackling voice problems

CHART 4, which follows, gives a comparison of the ways and possibilities of tackling voice problems up to now and in the future. More respondents would hereafter, in case of a voice disorder, see a phoniatician, and others would see their practitioner. They choose the practitioner partly because the specialized care (phoniatory, ENT specialists) is less accessible in their neighbourhood, and partly because they trust their practitioner (*„he/she has known me for a long time“*). On the other hand, from my practice I know that the knowledge of voice disorders has increased and that most practitioners, if they suspect a rather serious disease, refer the teachers (and other patients) to specialized medical establishments (phoniatic, allergologic, endocrinologic and ENT departments).

CHART 4: The ways of tackling voice problems



The comparison with the previous examination shows that there are fewer respondents now that would tackle their voice problems without anybody’s help. A risky attitude to one’s voice can be illustrated by the woman teacher K.L.’s statement: *“Ten years ago I lost my voice 3 times during 2 months; I only wheezed and was unable to speak at all. This always subsided after 3 days and I never saw a doctor”*.

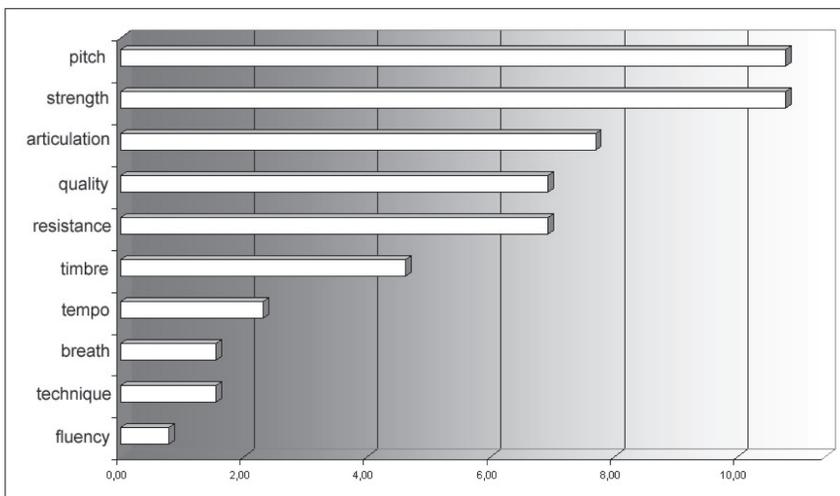
Other solutions of voice problems, as given by the respondents, are homeopathic treatment and the use of medicines bought at the chemist’s on the chemist’s recommendation and advice. A healer has appeared in the statements for the first time as a potential adviser on voice problems.

Subjectively felt need for a change of one's speaking voice

Although 86 % of the respondents are content with their speaking voice, 41.54 % of the total number of the respondents feels subjectively that some parameters of their voice should be changed.

Most of the respondents would like to lower the pitch of their voice (they feel that their voice is unpleasant, too high and sharp), or, on the other hand, to raise the pitch of their speaking voice (they feel that their voice is too deep, that "it has dropped"). About the same part of the respondents feels that they need a stronger voice. A noticeable priority is an improvement in the articulation; some of the women teachers even had defects that needed logopaedic care.

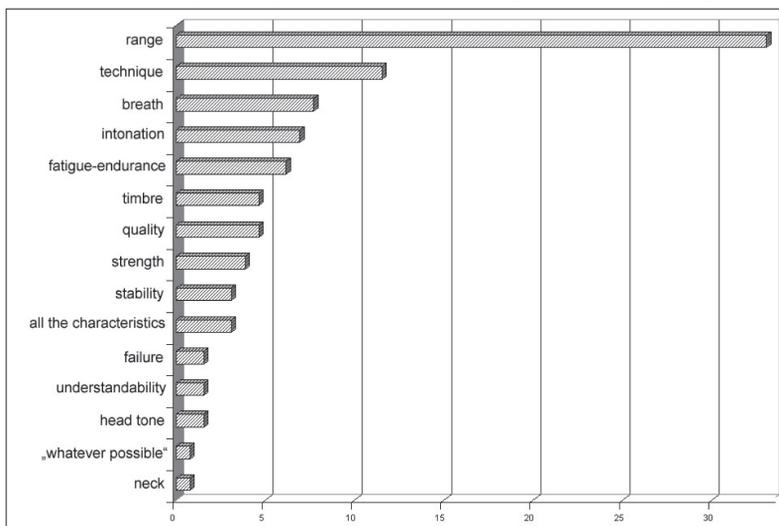
CHART 5: Subjectively felt need for a change of one's speaking voice



Subjectively felt need for a change of one's singing voice

In evaluating subjectively the quality of their singing voice, most respondents give positive evaluating judgements (the singing voice: 63 % of the respondents are satisfied with it and 38 % dissatisfied; the speaking voice: 86 % satisfied and 14 % dissatisfied), but a considerably higher percentage of the respondents are content with their speaking voice. Music teachers seem to perceive the parameters of the singing voice as much more differentiated; their voice evaluation is, due to their specialization, also more professional than that by teachers who do not do subjects connected with singing (see CHART 6).

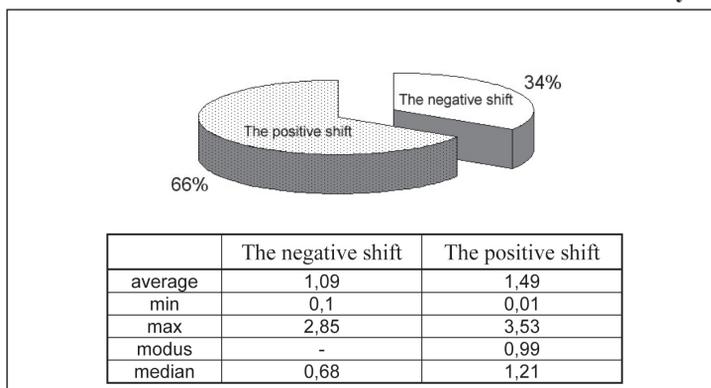
CHART 6: Subjectively felt need for a change of one's singing voice



The comparison of the 1st and the 2nd DSI measurements of the first group of the examined persons

A part of the examined teachers (about a third of them) have already been measured twice by means of the Dysphonia Severity Index. The 2nd measurement shows a moderate positive shift in the majority of the examined persons, but also a moderate negative shift in the remaining clients (see CHART 7). As the table in CHART 7 shows, the positive shift is approximately by one point and a half, while the negative shift by about one point.

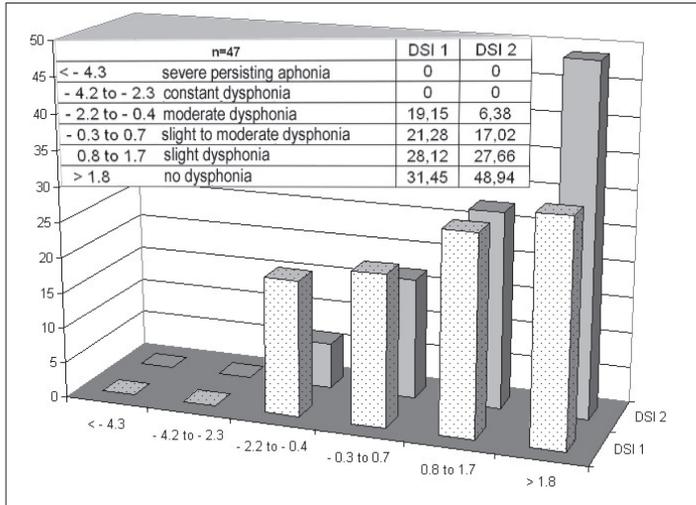
CHART 7: The shift of the DSI values after the interval of one year (n = 47)



It must be stated that even the 1st measurement showed that most of the examined teachers did not fall below the norm (i.e. they had no dysphonia). The most con-

spicuous was the shift in the interval -2.2 to -0.4 (moderate dysphonia). There was just a small shift in the interval -0.3 to 0.7 (slight to moderate dysphonia) and practically no shift in the interval 0.8 to 1.7 (slight dysphonia). The number of examined persons with $DSI > 1.8$ increased slightly (for the details see CHART 8).

CHART 8: The comparison of the 1st and the 2nd measurements of the first group of the examined persons



It follows from the analysis of the questionnaires and the examined persons' statements in the diagnostic phase of the recording of their voices that during the year's interval they were activated by the requirements of their study disciplines directly connected with voice performance, and that their attitude towards their voice was also influenced by the disciplines giving information on the work with voice and directly or indirectly on voice hygiene. Due to the practice demands for fitness as well as quality of voice they also began to appreciate their senior colleagues' experience and to focus on the practical application of the various ways of voice care.

Conclusions

- The extent of the knowledge on voice hygiene in the sample of the examined teachers has improved slightly in comparison with the previous research, but it has not yet reached the level one would expect in expert pedagogues;
- the ways of tackling voice problems proceed from the given sources of knowledge, but the approach seems to be rather intuitive and narrowly empirical, without the necessary influence of the knowledge based on theory;
- a positive trend can be seen in the fact that the examined teachers started to tackle their voice problems more actively, including their appreciation of medical assistance and consultations with specialists;

- the subjectively felt need for a change of the speaking and the singing voice does not always correspond with the subjective evaluation of the voice, which also suggests that the perception of voice as the working tool is problematic;
- the DSI values measured in the same sample after a year's interval suggest a slightly positive trend, which seems to reflect the real current situation of the examined sample persons: they concentrate on work with voice now and train their voice; they are more than before interested in the problems of voice and its parameters; they pay more attention to some recommendations concerning voice hygiene as well as to their senior colleagues' experience in the field of voice condition; more than before they tend to appreciate all information on voice hygiene and to apply it in practice; they are now more interested in the impact of their profession on their voice.

ZMĚNY KVALITY HLASU UČITELŮ MĚŘENÉ DSI VE VZTAHU K UČITELSKÉ PROFESI

Abstrakt: Příspěvek navazuje na předchozí etapu šetření, zaměřeného na zkoumání změn kvality hlasu ve vztahu k profesnímu zatížení. O jeho průběžných výsledcích jsme již referovali (Frostová, 2008).

V první etapě projektu proběhlo šetření u 47 respondentů – studentů kombinovaného studia působících ve výchovně vzdělávacím procesu. Po roce byly u těchto ZO opětně pořízeny hlasové snímky a byla provedena analýza charakteristik hlasu pomocí standardní metody DSI (Dysphonia Severity Index).

Zároveň byly získány snímky od dalších učitelů, které budou srovnány v dalším roce a zvýší objektivitu získaných výsledků. Znovu též byly registrovány údaje získané z dotazníku zaměřeného na subjektivní percepci mluvního i zpěvního hlasu, na vědomosti o hlasové hygieně, na zdroje těchto vědomostí a na subjektivní hodnocení hlasové zátěže v mimopracovních aktivitách.

Výsledky naznačují mírně pozitivní změny v charakteristikách hlasu vyjadřovaných mírou DSI v důsledku aktuální práce s hlasem a zároveň možnost užití DSI jako indikátoru potřeby reedukace či terapie hlasových obtíží u učitelů.

Klíčová slova: hlas, učitelé, hlasová hygiena, hodnocení hlasu, Voice Handicap Index, Dysphonia Severity Index